

# PHILOSOPHICAL TRANSACTIONS.

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*A Continuation of Dr. Daniel Coxe's Discourse, begun in Numb. 107. touching the Identity of all Volatil Salts, and Vinous Spirits; together with two surprizing Experiments concerning Vegetable Salts, perfectly resembling the shape of the Plants, whence they had been obtained.*

**T**HAT which hath been said of *Alcalizate Salts*, may likewise be affirm'd concerning *Volatil Salts*, and *Vinous Spirits*: The former are afforded not only by vegetables and Animals, but also by some Minerals: And altho' immediately upon their production or extraction out of the several substances which did yield them, they appear sensibly different from each other, and are without dispute endow'd with very different properties, chiefly Medicinal; yet they may all by flight artifices be reduced unto such a Simplicity and Identity, as that neither the most acute and faithful Senses, nor the most rational and nice Experiments, can find or make, without additaments, the least disagreement or discrimination.

*Volatil Salts* abound in most Vegetables, from which they sometimes may be extricated by simple Distillation; but usually previous Fermentation is required: of which operation I have formerly

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rendred

\* See Numb. 101. rendred a particular Accompt\*. This Salt may also be obtain'd from *Soot*, *Urine*, the *Blood* of Men and other Animals; from *Bones*, and especially *Cranium's* or Skuls of Men; from many sorts of *Horns*; (and indeed no subject yields them so copiously, as those which are annually cast by *Staggs* or other *Deer*;) from *Vipers* in great plenty; as also from divers other Animals. I need not here mention *Facitious Salt Armoniack*, that being a commixture of several of the mention'd Substances with Sea-Salt. Also many Minerals and Fossils contain Volatil Salt; vast quantities of Salt Armoniack being found in many parts of the *East*; which was probably sublimed into those Caverns, whence it is extracted by the force of Subterranean Fires: Which conjecture is sufficiently authoris'd by the same Substances being gather'd near the *Crateres* or Mouth's of our *European* Vulcans of *Ætna*, *Hecla*, *Vesuvius*, in *Campis Phlægreis*; in *England* also near the Mouth's of several Coal-Mines which have been accidentally fired: And of recent memory that Torrent of melted Minerals, which boiled over the Crucible (if I may so speak) upon the late Conflagration in *Sicily*, and poured itself into the adjacent Plains. This liquid Fire, as it cooled, condensing, became crusty at top, and almost every where Stones of Salts were sublim'd or thrust forth by the violence and fury of the Heat. Some of these Salts resembled the vulgar Sea-Salt; others, Niter; some were of an Aluminous and vitriolick nature; but that which was most copious and universal, was Armoniack; which although much discoloured, and rendred very impure in most places by its union with various metallick and mineral particles, yet did chiefly, as the Facitious Salt Armoniack, consist of Marine and Volatil, commonly call'd *Urinous* Salts, as did also the fore-mention'd; as many Experiments have inform'd me, too numerous and tedious to be here inserted. Besides these Mineral Substances already mention'd, several sorts of Earth, Clays and Marle, which are fetch't from the Superficial or Cortical part of the Earth, do contain store of Volatil Salts; which appear upon Distillation: And from some of them I myself have frequently seperated greater quantities than will be easily credited. It would waste more time and paper, than I am willing to lose, and require more patience in the Reader than the Subject deserves, should I relate or particularly enumerate the peculiar Sensible and Medicinal properties, whereby the Salts are discriminated, which the several fore-mention'd Substances do afford. I shall therefore at present only suggest, what in my apprehension renders them so multifariously different from each other; and then discover, How they may be reduced

reduced unto the same Common nature, and, if you please, being united, become an Uniform and Homogeneous Substance; wherein I may challenge the most severe Criticks and experienced Chymists, to find a greater variety of Parts and Qualities, than what is absolutely necessary to constitute the Essence and Definition of a Volatil Salt in the abstract.

It was long since by the famous *Van Helmont* judiciously observ'd, and by many Experiments confirmed, That variety of *Sulphurs* did chiefly discriminate the *Species* of Mixt bodies, and that most of the considerable changes, which were made in or upon them, were occasion'd by separating their own, or super-inducing an extraneous, Sulphur. If this be affirm'd of Sulphur, a pretended Simple Homogeneous body, and the second Principle of the Chymists, it is denied: But if he intended, as is most probable, by *Sulphur* a substance, which, when separated, is usually inflammable, and doth ordinarily appear in an Oleaginous form, I esteem his assertion very probable and specious.

Let us make a short reflection on the Oyles extracted out of Vegetables by the assistance of Common water, which are as'twere a Compendium of the Vegetables that afforded them, being eminently and manifestly enobled with most of those sensible and those more hidden Qualities that did determinate the Vegetables whilst flourishing: Whereas their Salts, whether fixt or volatile, their Waters and Earths, can boast of little, which discovers whence they proceeded, unless they retain some small portion of their respective Oyles, whose presence occasions those slight differences, which discriminate them from each other, and being thereof deprived, they relapse into their Elementary simplicity. The same happens, as with Fixed, so in Volatile, Salts, which are different so long as they retain any mixture of those Oyles and Sulphurs, wherewith the Concretum that afforded them was imbued; from which being freed they all agree in one Common essence.

Although I could confirm this Position by a great number and variety of Experiments, I shall for the present acquiesce in some easy and obvious operations, which will sufficiently manifest, that all Volatil Salts, being freed from adhering Oyles or Sulphurs, become forthwith Homogeneous and Uniform.

Take any Volatil Salt, whether Vegetable, Animal or Mineral, put it into a very tall Glas-body or Bolthead; sublime the Salt in Ashes, B. M, in a Lamp-furnace, or with other equal temperat heat, the more remiss the better. Repeat this Operation twice or thrice:

Most of the Oyl remains at the bottom, or adheres to the sides of the vessels employed; and the Salts will not easily be distinguish't from each other, agreeing in most, if not all, manifest qualities.

But, because this Operation will not so well succeed, unless the Vessels be very conveniently shaped, and the fire exactly regulated by a Judicious experienced Artist; for, either skill or due care being wanting, some small portion of the more subtile fugitive Oleaginous or Sulphureous particles will ascend with, and infect the Salts, which are thereby still in some measure (if I may so speak) specificated: I shall briefly represent a more certain and facile method of reducing them into one Common nature and denomination. Pour upon the Volatil Salt, you would purify, a convenient quantity of well-rectified Spirit of common Sea-salt. When the Salt is fatiated, (which is discerned by ceasing of the heat, ebullition or commotion,) then with a gentle equal heat abstract the phlegme, and with it some small quantity of Volatil Salt, which not being closely united, is upon the first accession of heat presently dismissed. Sublime the remaining dry substance, which will become good Armoniac Salt. This being pulverised, and mixed with equal parts of a pure and well-calcined Alcalifate Salt, or if you pour thereon a strong *lixivium* or Solution of any perfect *Alkali*, the Alcalifate Salt combining more closely with the Acid than the Volatile; this latter will be elevated by a small degree of heat, and appears, either immediately, or upon rectification, in the form of a dry subtile fugitive Salt, perfectly free from the contagion of Oyles or Sulphurs, And by this Common method of procedure All volatil Salts, although the Tribes and Concrets that afforded them were exceeding different and distant, and they also disagreeing in Sensible, and (as they are commonly stiled) Occult qualities, are brought unto a perfect agreement in some few common properties.

I might add, that, whatsoever can be effected by Artificial operations, in order to the Un-specificating of Volatile Salts, is more naturally and speedily perform'd by the *Air*\*, which is, as I could fully demonstrate, impregnated with a Volatil Salt, *partly* sublimed by Subterraneous, and extracted by Celestial, fires; *partly* expired from Animals during their life; and both from them and Vegetables upon the dissolution or dissociation of their constituent parts in Are-factions and Fermentations. These Salts, being received into the vast

\* See Mr. Boyle's Tract of Suspicion about some Latent Qualities in the Air, lately printed, and come to my hands when I committed this Discourse to the Press: Of which Tract I should have given an Account in these Papers among other Books, but that it is accompanied with some other pieces, that are not yet quite printed off.

vast subtle fluid **Expanse**, are immediately devested of their discriminating properties, and become the Instruments of sundry remarkable effects and operations, not only in Natural, but also Artificial, productions : Which Salt may be obtain'd by sundry methods, and out of several substances in its pure simplicity ; but being once dissolv'd in Rain, and Dews, and thereby innu-  
 nuated into the Earth, or otherwise caught and conveyed into Vegetables, they are soon speciated, and by union with the other Principles or Corpuscles of a different nature, do degenerate, or are exalted (which you please,) and of Simple (at least comparatively) become Compound substances ; yet easily again reducible, by Nature or Art, unto their primitive Simplicity.

These are not Dreams of a delirious Chymist, but Positions, which I could confirm by an entire *Series* of Experiments ; possibly hereafter to be communicated, if upon a strict *examen* I find them worthy publishing in this Inquisitive and Judicious Age.

It remains, that I should detect the same Identity or Uniformity of nature and properties to reside in all, highly rectified, *Vinous Spirits*, which we have discover'd in Salts both fixt and volatil.

That *Vinous* spirits are only (or at least chiefly) the more subtle fine Oyles of Vegetables, by fermentation broken into lesser particles, and less branched than those which constitute the Oyles themselves will appear highly probable to him, that shall duly consider the Manner of their production, and seems demonstrable by divers obvious Experiments. For, the same quantity of Vegetables, which being distilled with water, no fermentation preceeding, yields Oyl plentifully, and little, if any, Vinous Spirit ; being distilled after a convenient time of Digestion, and the addition of some proper Ferment, they afford store of Vinous spirits, and if fully fermented, there is little appearance of Oyl. Also the same Herb fermented after its Oyl is extricated by the usual method, yields a far less proportion of Vinous spirits, than when fermented, before it was deprived of its Oyl. That portion of the Oyl, which is by the fermentation divided into lesser particles, although, notwithstanding this comminution, they are (according to the *Cartesian* Hypothesis) branched enough to continue inflammable, yet being minute, do not affect the Palate after such different manners, or make upon it such a variety of impressions, as those that are occasioned by impulses from the more gross Oleaginous particles.

Now, if the smaller and more subtle matter, which we shall henceforth call'd *Vinous Spirits*, being press'd by heat, carry up and convey

convey along with them some entire unbroken Oily parts, or receive them that are capable of being elevated with the same degree of heat by which they were raised; these mixtures will retain somewhat of the most remarkable differences in Taste, and sometimes Odour, whereby the Vegetables themselves on their Oyls were discriminated: But upon long frequent Digestions, or reiterated Distillations, these gross Ocreaginous particles are either subdivided, and thereby become Vinous spirits, or that gentle equal degree of heat, which is sufficient to elevate the more active volatil Vinous spirits, cannot raise the more sluggish Oyles; so that the Results are pure single homogeneous Vinous spirits, which, whatsoever the Concretes were from whence they were derived, though vastly differing from each other, as also their Oyls, out of which the Vinous spirits were more immediately produced; yet the Spirits themselves thus purified are in Outward appearance similar, and perhaps as perfectly simple and homogeneous, as most substances in the Universe.

What I have deliver'd, is further confirmed by a more visible palpable Conversion of Vegetable Oyles into Vinous Spirits; which I have effected in *many*, and, by Analogous operations, I presume, the same change may be superinduced upon *all*. Pour upon an ounce of some common vegetable Essential Oyl two or three pound of Vinous spirit perfectly dephlegmed; (the greater quantity, the more speedily is the transmutation or change performed:) The Spirit will immediately, upon simple agitation, absorb, devour, or dissolve the Oyl, which by long digestion or reiterated cohobations may be totally divested of all those peculiar properties, it enjoyed whilst an Oyl, and become perfectly Vinous, never to be separated in a distinct form, or by any known *diacritical* sign, or artifice, to be discriminated from what hath, in all appearance, converted or transmuted it into its own nature, or, at least, into a substance so like itself as to deserve the same denomination.

I shall here instead of a Conclusion impart unto you two very odd surprising Experiments, which have some, though remote, relation unto the preceding Discoveries concerning Alcalizate and Volatile Salts.

Having procured a great quantity of *Fern*-ashes, I extracted their Salt after the common method with water; most of the water being evaporated, I obtain'd several pounds of Salt, the greatest part whereof being first dried, I exposed the remainder unto the Air, that it might arrest some of the Vapors sitting in the same, and thereby

thereby became fluid; which is commonly, tho' improperly, stiled an *Oyl per deliquium*. The rest of the *lixivium* which continued fluid, being filtered whilst warm, was of a very red colour, deeper than that of *florid Blood*, or of most *Clarets*, and exceeding ponderous: The *colour* argued it abounding with Sulphureous or Oily parts, and the *weight*, that it was highly satiated with the Saline. Having put this strong Solution into a capacious glass, I either forgot or neglected it five or six weeks; and then looking after it, my Eyes were unexpectedly saluted with a most pleasant spectacle, which having arrested, did immediately fix, detain and employ them in the contemplation of an Object, which did at once most charmingly invite and fully requite their greatest attention, The *Lixivium* had deposited a large portion of the Salt it formerly contained, part of which subsided, I suppose immediately upon its cooling; and, several weeks of very cold weather ensuing, did occasion the Precipitation of more: So that, according to my estimation, it was at least 2 inches thick over the bottom of the Vessel. The lowest part of the Salt was of a dark colour, as if some earth, dirt, or dregs, were admixt therewith. The upper part or surface contiguous to the Liquor was exceeding white; and there did arise or spring out of the whole mass of Salt, at small distance from each other, several, I believe 40, branches, which, abating the colour, did most exactly resemble that sort of *Ferne* which is single like *Polypody*, and not branched, sending out several leaves on each side from one stem. Their magnitudes were divers, but the figures so all were the same, without the least variation; only some emitted more leaves from the stem than others; which is also usual in the Natural Fern. I preserv'd these Artificial, regenerated or resuscitated Vegetables many weeks in the same position, not moving them, they being of so tender a fabric, that the least motion of the Glass did hazard their disappearance. Several persons were entertain'd with this admirable Phenomenon; and enquiry being made, before they were prepossessed with the foregoing Relation, what Herb they did apprehend this pretty Phantasm represented, did unanimously refer it unto Fern, But this agreeable Scene soon vanished; for, upon my return out of the Country, where I then resided, unto *London*, although I had used all imaginable care and diligence to preserve them in their pristine beauty and integrity, by agitation during the Journey, or some other accident, these pretty appearances were resolv'd into the confused Chaos out of which they were educ'd.

Obs. 1. The Fern was of a middle constitution between green and dry when burnt.

2. It was employed to dry Malt burnt in a Kiln with a close smothering heat.

3. Therefore the Ashes yielded a far greater proportion of Salt, than when the Herb is very dry, and incinerated by a free open fire.

4. From the same causes the Salt was not perfectly Alcalizate, but plainly Tartareous, and abounded with Oyl and Acid particles; and therefore might properly enough be called an Essential Salt: And upon fusion with a strong fire was much changed, from a dark brown becoming white, and was by the action of the fire much lessen'd in bulk, the consequence of the avolation of Oyl, Acidities, and perhaps other Substances, during the operation of so strong a fire.

5. That part of the impure Salt, which, as I before intimated, was set to deliquate, did not, as is usual, become liquid, but a perfect gelly, which could not by any method be afterwards reduced unto its saline form: Which recalls unto my mind what is deliver'd by *Kircher* of his own personal experience in the Resuscitation of Plants, who affirms, that at some certain time of the operation the prepared Vegetable Substances appear in such a form.

The other Experiment concerning *Volatil* Salts succeeded after this manner;

Having occasion for *Volatil* Urinous Spirits for some ordinary uses, I mixte equal parts of Sal Armoniac and Pot-ashes, which latter had a very strong sulphureous smell, yet did seem to abound with Salt, and that considerably Alcalized. The mixture being put into a tall Glas-body, immediately upon its feeling the heat, plenty of a *Volatil* Salt sublimed, from which I expected no unusual appearance, having often repeated this operation without observing any circumstance which deserv'd peculiar attention. Being called from my Laboratory by some Company or Employment just as the Salt began to appear, at my return I was amazed to see in the Glas head, which was, as the Cucurbit, very spacious or capacious, a Forest in perspective, so admirably delineated, as not to be excelled, if imitated, by the pencil of the greatest Masters in painting. They were all, not only to my apprehension, but also in the Opinion of several Spectators, ready to attest it, Shadows, Rudiments, Adumbrations, or Representations of *Firrs*, *Pines*, and another sort of Tree which I cannot easily describe, nor have I ever seen it growing wild or in gardens, or in any Herbal exactly represented. All these Images, although very numerous

rous, very reducible to one of these *three* species. I do not remember, that I have ever seen any more transportingly agreeable Appearance in any Chymical operation, although it is well known, that Chymistry doth daily present those, who are very conversant with her, a great number and variety of objects, highly diverting for their prettiness and curiosity in colour, figure, and other accidents.

But to return unto the foremention'd Operation, I am not ignorant, that Volatil Salts do constantly shoot into variously and beautifully shaped Crystals, but I could never observe them regular, or reducible unto a certain number of figures; whereas in the Operation we have described, the figures were *first* very different from any that ever appear'd before or since upon Distillation of Commixture, and distillation of Pot-ashes and Salt Armoniac, altho' by me frequently repeated; as neither upon the Distillation and Rectification of Hartshorn, Blood, Urine, *Cranium humanum*, Salt Armoniac with Lime, Salt of Tartar, and other Alcalies. *Secondly*, The Figures were all reducible, in the Apprehension of every Spectator, unto *three* kinds, two of them commonly known; and some of them were persons not easily bribed by fancy.

Howsoever, had I been considerate and well advised, I might have easily silenced doubt and detraction both by preserving the Glass containing this beautiful Scene, which was prevented by my astonishment at, and too greedy contemplation of so delicious a spectacle; whereof, to my great grief, I was soon deprived by the Sublimation of more Salt, which filling up the Interstices, did, together with the former, case the Glass, and retain no other Figure than the Concavity thereof allow'd of.

The next day that great Virtuoso, Sr. *Robert Moray*, (whose memory can never be too much cherished, nor his loss sufficiently bewailed,) honouring me with a visit, I acquainted him with the lately recited Accident; who scrupled not, though a rigid Philosopher, to credit my Relation, and to confirm me in the belief, that some certain governing principle might contribute towards the production of this *Phænomenon*. He affirm'd that one *Darvison*, a famous and experienced Chymist at *Paris*, had frequently shew'd him in a Glass a great company of *Firrs* and *Pines*, which seem'd no less lively and accurate, than those produced by Painters are; but such suspicions were soon stifled by their speedy disappearance and easie reproduction. He also referr'd me unto his Book of *Chymical Operations*, where I find he makes mention of it,

as a great artifice, as really it was, and makes it no less a mystery by concealing the process or manuals, whereby it may be effected; only, that nothing was employed besides substances afforded by the trees which were represented; and that the chief ingredient was Turpentine. Herein his operation differ'd from that which I lately recited; in that the substance, out of which he raised those shapes, was of a more Fixed Nature; that which afforded mine Volatil to the highest degree: *He* could constantly and regularly produce these Figures; but mine did unexpectedly and fortuitously represent themselves unto my view; neither do I ever again expect the like appearance. Nor will I contend with *him*, that shall affirm, it was a mean <sup>an</sup> Phantasmie, or a fortuitous Coalition of Salt into such pretty figures. But that they were not really such as I have related, the most Satyirical *Railleurs* or most obstinate *Scepticks* shall never prevail upon me to recant and deny.

*More Observations from Mr. Leewenhook, in a Letter of Sept. 7. 1674. sent to the Publisher.*

**I** Took, (*suit he*) the Eye of a Cow, and having with a great pin pierced the Cornea, I found in the *Aqueous humor*, which I took out, some few crystallin globuls swimming. The dark-brown colour, which I saw in this Eye did consist of dark gray globuls.

The *ChrySTALLIN Humor*, which in hardness almost resembles a Nutmeg preserv'd, I have with a razor cut asunder, and observing it in parcels, I found it to be made up of orbicular Scaly parts, lying upon one another, which had their beginning out of the Center, and did all consist of crystal in globuls.

After I had let this ChrySTALLIN humor dry for three dayes, it was grown so hard, that, when I put the knife to it, it burst in pieces as if it had been hard rosin. These pieces being by me view'd again, I not only found in them the above said orbicular Scaly substance, but also, that every scale was composed again of circular parts, and that these circles run contrary to the first; like to a Globe made up of paper, to the uppermost part of which may resemble the outermost scale or plate of this ChrySTALLIN substance; under which uppermost Superfice there lyes another scale, and so on continually unto the center of the globe: This I take to be like the first orbicular scaly substance; of which the ChrySTALLIN humor is made up. The other round substance, of which each scale is composed, I see, as if upon the mention'd Globe there were drawn lines close by one another, the first thereof passing through both poles, and the others running along the sides thereof, just as if the superfice of the globe were

were compounded of such small parts as lines could be drawn upon a globe. And I found all these particles to consist of crystallin globuls. Two or three small pieces of this Crystallin body I have fixed to several pins of my Microscopes, which I have laid by, to shew them to the Curious upon occasion; not being satisfied to see such things myself alone, but very willing to present others with the same view; although I have already found more than once, that some have made their particular advantage by it.

Dr. *Swammerdam* hath again within this fortnight visited me twice, accompanied with a Gentleman, to both which I have shew'd many of these Microscopical Observations, and of such others as I had formerly spoken to him about; perceiving, that his speculations are busy upon this subject, and that probably he will discourse more largely of it than I have done hitherto.

To proceed; having view'd the *Vitrious* humor, lying deeper in the Eye, I saw *many more* globuls than in the *Aqueous* which I took out from the top of the Eye.

The transparent *Cornea*, after I had let it dry for several days, I view'd also, and found it likewise to consist of crystallin globuls; and endeavouring to sever the said tunicle in its thickness, I found the globuls thereof united so close, and compact, that the same seem'd to consist of manifold finewy particles, crossing one another: And how curiously soever I have hitherto endeavour'd to view some of the Scaly parts, yet I have not yet satisfied myself therein; I observ'd only some streaks resembling the scars of a newly whetted rasor. Mean time it seem'd, that this membrane would suffer separation when 'tis moist.

I formerly wrote to you, that till then I had observ'd, that all transparent and such particles, as lye upon one another, appear'd to our Eye white: The same I observe in the above-mention'd *Crystallin* liquor when dried hard and then beat to pieces: But when 'tis moist, 'tis then not white.

In the *second* Tunicle of the Eye, there appear'd divers very fine glittering colours, and it was black, and consisted also of globuls, and viewing the single globuls, I found them dark; and passing my finger over this colour'd membrane, and the same being grown dry, the colours were gone, and the membrane was darker.

The *third* Tunicle, was exceeding thin and tender, and having viewed it, I found it also to consist of globuls united.

I communicated these Observations to *Doctor Scraevsand*, and shew'd him the Crystallin humor; and he mentioning, that some

Anatomists affirm'd the *Optic* Nerve to be hollow, and that themselves had seen that hollowness, thro' which they would have the Animal spirits, that convey the visible species, represented in the eye, pass into the Brain; I thereupon concluded with myself, that, if there were such a cavity visible in that Nerve, that it might also be seen by me, especially since, if it be so, it must be pretty bigg, and the body of it pretty stiff, or else the circumjacent parts would press it together. And in order to this discovery, I solicitously view'd three *Optic* Nerves of Cows; but I could find no hollowness in them; I only took notice, that they were made up of many filamentous particles, of a very soft substance, as if they only consisted of the corpuscles of the Brain joined together, the threds were so very soft and loose: They were composed of conjoined globuls, and wound about again with particles consisting of other transparent globuls.

These Observations I likewise imparted to the lately named *Doctor*, who thereupon encouraged me to proceed to others; which made me to attempt a view of the *sixt* pair of Nerves, call'd *par vagum*, cutting it off about the pipe in the Lungs of a Cow, and finding it to consist of a very few filamentous particles, composed of globuls joined together, which threddy parts are very strong, (to which those of the *Optic* Nerve, as to strength, are not at all to be compared) and they lay as wound about with a matter made up of pellucid globuls, of which the small threds were composed. Further, that Nerve within was for the greatest part filled with globuls far bigger than those, of which the Nervous parts were made up; which filling globuls, I can judge to be nothing else but Fatt. And betwixt this Fatt and the Nervous filaments I at first saw now and then some hollowness, which I esteem'd might have been caused by the knife. This I did with much solicitude further inquire into; whereupon I found not only one hollowness, but as often as I cut the Nerve asunder, the hollowness still continued therein, and I found in some places not only one cavity, but two or three cavities at once; and where the cavity of the nerve was any thing bigg, it was lined about with filmes, as if they had been purposely contrived there to keep open those cavities, and to keep them from being compressed by the surrounding parts.

This cavity in the Nerve was also furnisht with a Tunicle, as if it had been a great Artery (in proportion to the Nerve.) In the same Nerve I also saw several little Arteries running through. But as to its strength, that was but very slender, not fit for any strong motion forasmuch

forasmuch as I observ'd, that, besides the Tunicle, it was in some places provided only with two or three threds; and it was moreover filled with *fatt*, and had the before-mention'd hollownefs.

To pafs on to other objects; I have observed fomewhat about *Salt*, of which I took a little and put it on the brim of a Tin difh and fo let it melt in my cellar, and having expofed that Brim to the hot Air, or the Fire, I had it turn'd into Salt again; and then found, that fome of thofe Saline parts confifted of globuls, others of Conical fmooth particles, others were pyramidal and fmooth, fome perfectly quadrangular, and fmooth, fome long-ways quadrangular; in both of which latter I faw again fome very fmall fquares.

More-over, I have alfo viewed fome of the *Engliſh* Earth which is yellowiſh, and fome that is of a deeper yellow then that, which is found between *Harwich* and *London*, and wherewith fome Land is only as 'twere cover'd; Which yellowiſh Earth our Potters of Porcelan-ware make uſe of, when they want that *Flamiſh* Earth that is got about *Tournay*. This *Engliſh* Earth I found to be made up of very fine globuls, which by my eſtimate I judged to be many thouſand times ſmaller than a common grain of ſand, after a Geometrical computation, by which the *axis* of a grain of Sand is many hundred times bigger than the *axis* of one of the particles which compoſe the ſaid *Engliſh* Earth.

I have likewiſe examin'd the lately mention'd *Flamiſh* Earth, which I found to conſiſt of globuls, yet fomewhat ſmaller than thoſe of the *Engliſh* Earth.

Again, viewing that ſort of Earth, which we call *Clay*, of which there is a great ſtore about this Town of *Delft*, and elſewhere in this Country, that is made up of yet ſmaller globuls than both the foregoing ſorts, and 'tis by our Porcelan-makers call'd *Black Earth*, being of a dark gray colour. The globuls of this Earth are not ſo heavy as thoſe of the deſcribed *Engliſh* and *Flamiſh* Earth; and 'tis eaſily changed into Glaſs; and they make very ſtrong Pots of the ſame: But being bak'd, 'tis red, and therefore not fit for Porcelans, but 'tis blended with the *Engliſh* and *Flamiſh* Earth, to give a ſtrong and good ſound to our Porcelan. Mean while I did not find this *black Earth* ſo pure as the other, it being mixt with other particles which I did not think to be Earth, but rather eſteem'd them to be *rotten wood*, mixed with ſand and ſandy particles, that were above a hundred times ſmaller than ſand.

About two Leagues from this Town there lyes an Inland-Sea,  
called

called *Berkelfe-Sea*, whose bottom in many places is very moorish. This water is in Winter very clear, but about beginning or in the midst of Summer it grows whitish, and there are then small green clouds permeating it, which the Country-men, dwelling near it say is caused from the Dews then falling, and call it *Heny-dew*. This water is abounding in Fish, which is very good and savoury. Passing lately over this Sea at a time, when it blew a fresh gale of wind, and observing the water as above described, I took up some of it in a Glass-vessel, which having view'd the next day, I found moving in it several Earthy particles, and some green streaks, spirally ranged, after the manner of the Copper or Tin-worms, used by Distillers to cool their distilled waters; and the whole compass of each of these streaks was about the thickness of a man's-hair on his head: Other particles had but the beginning of the said streak; all consisting of small green globuls interspersed; among all which there crawled abundance of little animals, some of which were roundish; those that were somewhat bigger than others were of an Oval figure: On these latter I saw two legs near the head, and two little fins on the other end of their body: Others were somewhat larger than an Oval, and these were very slow in their motion, and few in number. These *animalcula* had divers colours, some being whitish, others pellucid: others had green and very shining little scales; others again were green in the middle, and before and behind white, others grayish. And the motion of most of them in the water was so swift, and so various, upwards, downwards, and round about, that I confess I could not but wonder at it. I judge, that some of these little creatures were above a thousand times smaller than the smallest ones, which I have hitherto seen in chees, wheaten flower, mould, and the like.

*An Account of some Books.*

- I. *Die AFRICANISCHE Landschaft FETU beschrieben durch Willhelm Johan Muller von Harburg; Gedruckt zu Hamburg, 1673, in 120.*

**T**His piece, composed and printed in *High-dutch*, containing divers not inconsiderable observations made by an Author, that lived eight years in *Fetu*; it was thought, the Reader would not be displeased to find such of the Observations as are suitable with the design of these Papers, Englished, and transferred hither.

The Province or Country of *FETU*, (the subject of this Book,) is situate about the middle of the Gold-coast in *Guiny*, in  $5\frac{1}{2}$  deg. Northern latitude: In length reaching from *Cabo Corfo* to the borders